CLAIMS

1. (Currently Amended) A sound diffuser with low frequency sound absorption for diffusing and absorbing sound waves, comprising:

a) a non-sound absorbing body having a front surface configured to diffuse some of said sound waves, and a rear surface; and

b) means permitting others of said sound waves to travel from said front surface to said rear surface through said body, said permitting means comprising a plurality of openings including a first opening and a second smaller opening, and

c) sound absorbing means on said rear surface of said body for absorbing said others of said sound waves below a desired cut-off frequency.

2. (Original) The invention of Claim 1, wherein said front surface includes a plurality of divided or non-divided parallel wells.

3. (Original) The invention of Claim 1, wherein said front surface includes a two-dimensional pattern of geometrical or irregular shape chosen from the group consisting of cylindrical, conical, pyramidal, polygonal or rectangular.

4. (Original) The invention of Claim 3, wherein said shapes are separated by slots or holes.

5. (Currently Amended) The invention of Claim 4, wherein said [permitting means comprises said] openings comprise slots or holes.

6. (Canceled)

7. (Currently Amended) The invention of Claim 1, wherein said [permitting means comprises] openings comprise a plurality of open slots.

8. (Currently Amended) The invention of Claim 1, wherein said [permitting means comprises] openings comprise a plurality of holes.

9. (Currently Amended) The invention of Claim 8, wherein said [holes comprise] first opening comprises a first set of holes and said second opening comprises a second set of holes smaller than said holes in said first set of holes.

10. (Original) The invention of Claim 9, wherein said sets of holes are arranged in rows of holes.

11. (Original) The invention of Claim 10, wherein each row of holes is located within a well of a diffusive surface.

12. (Original) The invention of Claim 10, wherein each row of holes is located across a plurality of wells of a diffusive surface.

13. (Canceled)

14. (Previously Presented) The invention of Claim 1, wherein said sound absorbing means is made of a porous absorptive material chosen from the group consisting of fiber glass, mineral wool, cotton and foam.

15. (Previously Presented) The invention of Claim 7, wherein the slots are narrow enough to provide measurable low frequency absorption.

16. (Canceled)

17. (Previously Presented) The invention of Claim 15, wherein said slots have a width of 0.1 millimeter to 1 millimeter.

18. (Previously Presented) The invention of Claim 16, wherein said holes have a diameter of 0.1 millimeter to 1 millimeter.

19. (Original) The invention of Claim 1, wherein a crossover frequency is chosen below which sound absorption takes place and above which diffusion takes place in accordance with required usage.

20-24. (Canceled)

25. (New) A sound diffuser with low frequency sound absorption for diffusing and absorbing sound waves, comprising:

a) a non-sound absorbing body having a front surface configured to diffuse some of said sound waves, and a rear surface; and

b) means permitting others of said sound waves to travel from said front surface to said rear surface through said body, said permitting means comprising a plurality of generally rectangular holes, and sound absorbing means on said rear surface of said body for absorbing said others of said sound waves below a desired cut-off frequency.

26. (New) The invention of Claim 25, wherein said front surface includes a plurality of divided or non-divided parallel wells.

27. (New) The invention of Claim 25, wherein said sets of holes are arranged in rows of holes.

28. (New) The invention of Claim 27, wherein each row of holes is located within a said well.

29. (New) The invention of Claim 27, wherein each row of holes is located across a plurality of wells of said front surface.

30. (New) A method of making an acoustical device which absorbs sound below a crossover frequency and diffuses sound above said crossover frequency, including the steps of:

a) choosing a desired crossover frequency;

b) calculating a number of perforations to be formed in an existing diffuser and their respective areas by using an existing standard acoustic formulation:

$$f=\frac{c}{2\pi}\sqrt{\frac{S}{LV}}$$

where f is the peak absorptive frequency, c is the speed of sound in air, S is the cross-sectional area of a hole, L is the apparent

depth of a perforated sheet, and V is an enclosed volume in a cavity;

c) forming perforations comprising generally rectangular holes of desired dimensions through a front surface of said diffuser to create said device;

d) designing a diffusive surface shape of said diffuser to create diffusion above the crossover frequency using techniques including but not limited to number theory and acoustical optimization;

e) installing said device.

31. (New) A sound diffuser with low frequency sound absorption for diffusing and absorbing sound waves, comprising:

a) a non-sound absorbing body having a front surface having a compound curved shape configured to diffuse some of said sound waves, said shape having curvatures extending in a plurality of diverse directions, and a rear surface; and

b) means permitting others of said sound waves to travel from said front surface to said rear surface through said body, and sound absorbing means on said rear surface of said body for absorbing said others of said sound waves below a desired cut-off frequency.

32. (New) The invention of Claim 31, wherein said permitting means comprises a plurality of holes.

33. (New) The invention of Claim 32, wherein said holes are arranged in rows of holes.

34. (New) A method of making an acoustical device which absorbs sound below a crossover frequency and diffuses sound above said crossover frequency, including the steps of:

a) choosing a desired crossover frequency;

b) calculating a number of perforations to be formed in an existing diffuser and their respective areas by using an existing standard acoustic formulation:

$$f = \frac{c}{2\pi}\sqrt{\frac{S}{LV}}$$

where f is the peak absorptive frequency, c is the speed of sound in air, S is the cross-sectional area of a hole, L is the apparent depth of a perforated sheet, and V is an enclosed volume in a cavity;

c) forming perforations of desired dimensions through a front surface of said diffuser to create said device;

d) designing a diffusive surface shape of said diffuser having curvatures extending in a plurality of diverse directions to create diffusion above the crossover frequency using techniques

including but not limited to number theory and acoustical optimization;

e) installing said device.